ROTATION SHAFT MECHANISM OF DISPLAY PORTION OF PORTABLE COMPUTER

FIELD OF THE INVENTION

The present invention relates to a rotation shaft mechanism of a display portion of a portable computer and, more particularly, to a rotation shaft mechanism, whereby a display portion is upheld at the same time when it has been opened up, to avoid that turning of the display portion from contacting and rubbing against a seat portion of the portable computer. Moreover, as the display portion is not opened up, the rotation shaft mechanism helps the portable computer fully closed.

BACKGROUND OF THE INVENTION

At the present time, most portable computers have a rotatable display portion in design. As shown in FIG. **1**, a conventional portable computer having a rotatable display portion **1** has a rotation shaft **12**, which is pivotally connected at a rotatable vertical shaft and serves as a rotatable horizontal shaft. The display portion **1** is opened up through the help of the horizontal shaft, and turned around through the help of the vertical shaft. Besides, a handle **21** is disposed at a base portion **2** of the conventional portable computer for of the portable computer. The display portion **1** also has a display screen **11**.

For the conventional computer using the rotation shaft **12**, because the stability of the rotation shaft **12** is insufficient, when the display portion **1** is opened up and turned around, the bottom edge of the display portion **1** is supposed to rub against top surface of the base portion **2** at somewhere such as **22**, as shown in FIG. **1**. This rubbing position **22** will straightly scratch top surface of the base portion **2** and destruct its delicacy, or even get stuck by keys on the base portion **2** when the display portion **1** is turned around, hence resulting in problems like scratches, erroneous key touching, and non-smooth rotation.

As shown in FIG. **2**, in order to avoid the problems in FIG. **1**, the rotation shaft has been improved to become a lengthened rotation shaft **13** so as to lift the display portion **1** a little bit. The above problems will not occur when the display portion **1** is opened up and turned around. However, the lengthened rotation shaft **13** will cause a gap **23** between the display portion **1** and base portion **2** will have a gap **23** therebetween due to the setting of the lengthened rotation shaft **13**, when the display portion **1** is opened up, leading the portable computer to not being closed completely.

Accordingly, the present invention aims to provide a rotation shaft mechanism of display portion of a portable computer to resolve the problems in the prior art.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a rotation shaft mechanism of a display portion of a portable computer so as to avoid scratches on the surface of the base portion when the display portion is turned around and the existence of a gap between the display portion and the seat portion when the display portion is opened up.

To achieve the above object, the present invention provides a rotation shaft mechanism of a display portion of a portable computer. The portable computer comprises a display portion, a base portion, and a rotation shaft mechanism disposed therebetween. The rotation shaft mechanism comprises a vertical shaft and two horizontal shafts having eccentric protuberances. The vertical shaft comprises a first component having a pair of symmetric projective ears punching through the horizontal shaft and a cylinder body, a second component slipped onto the cylinder body and having a projective wall corresponding to the eccentric protuberance, and a third component also slipped onto the cylinder body. The first and second components interfere with each other to rotate synchronously. An elastic component is further disposed between the lower portion of the cylinder body and the bottom face of the third component.

Further scope of the applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. **1** is a side view of a conventional portable computer after its display portion is opened up and turned around;

FIG. **2** is a side view of a conventional portable computer after its display portion is opened up;

FIG. **3** is an exploded perspective view of a rotation shaft mechanism of the present invention;

FIG. **4** is a perspective assembly view of a rotation shaft mechanism of the present invention;

FIG. **5** is a cross-sectional view of a rotation shaft mechanism of the present invention before operations;

FIG. **5A** is a cross-sectional view of a rotation shaft mechanism of the present invention after operations;

FIG. **6** is a side view showing that the present invention is applied to a portable computer and covering of the portable computer is closed;

FIG. **7** is a side view of FIG. **6** after the covering is opened up; and

FIG. **8** is a side view of FIG. **7** after display portion of the portable computer has turned around by 90 degrees.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. **3** to **5**, the present invention provides a rotation shaft mechanism of display portion of portable computer, which comprises a pair of horizontal shafts **3** and a vertical shaft. The vertical shaft comprises a first component **4**, a second component **5**, and a third component **6** shown in FIG. **3**. The horizontal shafts are for helping to open up and close the covering (a display portion) of a portable computer, while the vertical shaft is for turning the display portion around after it is opened up.

A small-diameter portion **32** protrudes from one end portion of each of the horizontal shafts **3**. An eccentric protuberance **33** protrudes from or is fixedly disposed (slipped onto and then soldered, pasted, or fastened) on the small-diameter portion **32**. When the horizontal shafts **3** turn around, the eccentric protuberances **33** thereof are synchro-